

IN THE CLAIMS

Please amend the claims as follows:

Claim 1 (Currently Amended): A process for the preparation of polyisobutenylphenol-containing Mannich adducts, comprising:

- a) alkylating a phenol with at least one polyisobutene having more than 70 mol % of vinylidene double bonds and a number average molecular weight of from 300 to 3000 at below about 50°C in the presence of an alkylation catalyst;
- b) reacting the reaction product from a) with formaldehyde, an oligomer or a polymer of formaldehyde and at least one amine which has at least one secondary amino function and no primary amino function, to form a Mannich adduct having a polydispersity of from 1.1 to 3.5.

Claims 2-7 (Canceled).

Claim 8 (Currently Amended): The process as claimed in claim [[7]] 76, wherein the basic alcohol/water mixture is a mixture of

- a) from 75 to 99.5% by weight of at least one C<sub>2</sub>- to C<sub>4</sub>-alcohol,
- b) from 0.4 to 24.4% by weight of water, and
- c) from 0.1 to 15% by weight of at least one amine which is volatile at room temperature.

Claim 9 (Previously Presented): The process as claimed in Claim 1, wherein an adduct mixture obtained includes from 0 to 20 mol% of polyisobutenylphenols from reaction step a) which are not reacted further.

Claims 10-19 (Canceled)

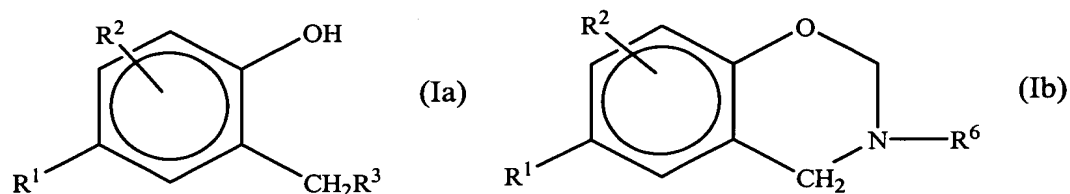
Claim 20 (Previously Presented): A process for the preparation of polyisobutenylphenol-containing Mannich adducts, comprising:

- a) alkylating a phenol with at least one polyisobutene having more than 70 mol % of vinylidene double bonds and a number average molecular weight of from 300 to 3000 at below about 50°C in the presence of an alkylation catalyst; and
- c) reacting the reaction product from a) with at least one adduct of at least one amine which has at least one secondary or primary amino function and formaldehyde, an oligomer of formaldehyde, a polymer of formaldehyde or a formaldehyde equivalent.

Claim 21 (Previously Presented) The process as claimed in claim 20, wherein the amine is at least one selected from the group consisting of 3-(dimethylamino)-n-propylamine, di[3-(dimethylamino)-n-propyl]amine, dimethylamine, diethylamine, di-n-propylamine and morpholine.

Claim 22 (Previously Presented): The process as claimed in claim 20, wherein the adduct is an aminal of formaldehyde with a secondary amine selected from the group consisting of di-C<sub>1</sub>-C<sub>8</sub>-alkylamines whose alkyl groups may be substituted by an N(C<sub>1</sub>-C<sub>4</sub>-alkyl)<sub>2</sub> group and cyclic amines which have 4 to 6 carbon atoms and whose cyclic structure may be interrupted by one or more of O and a N-C<sub>1</sub>-C<sub>4</sub>-alkyl group.

Claim 23 (Previously Presented): The process as claimed in Claim 20, wherein an adduct mixture is obtained which comprises at least 40 mol% of compounds of one or more of formula Ia and Ib,

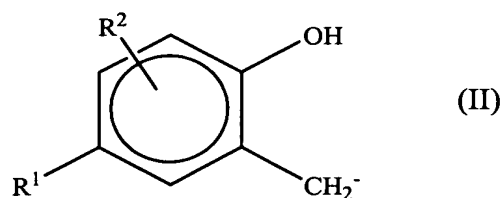


where

$R^1$  is a terminally bonded polyisobutenyl radical,

$R^2$  is H,  $C_1$ - to  $C_{20}$ -alkyl,  $C_1$ - to  $C_{20}$ -alkoxy, hydroxyl, a polyalkylenyl radical or  $CH_2NR^4R^5$ , where  $R^4$  and  $R^5$  have the meanings stated below, and

$R^3$  is  $NR^4R^5$ , where  $R^4$  and  $R^5$ , independently of one another, are H,  $C_1$ - to  $C_{20}$ -alkyl,  $C_3$ - to  $C_8$ -cycloalkyl and  $C_1$ - to  $C_{20}$ -alkoxy radicals which may be interrupted and/or substituted by N and O heteroatoms, and phenol radicals of the formula II



where  $R^1$  and  $R^2$  are as defined above;

with the proviso that  $R^4$  and  $R^5$  are not simultaneously H or phenol radicals of the formula II; or  $R^4$  and  $R^5$ , together with the N atom to which they are bonded, form a 5-, 6- or 7-membered cyclic structure which has one or two N and O heteroatoms and may be substituted by one, two or three  $C_1$ - to  $C_6$ -alkyl radicals; and

$R^6$  is a radical  $R^4$  or  $R^5$  other than H.

Claim 24 (Previously Presented): The process as claimed in Claim 20, wherein a Mannich adduct having a polydispersity of from 1.1 to 3.5 is obtained.

Claim 25 (Previously Presented): The process as claimed in Claim 20, wherein the reaction product from a) is reacted with at least one adduct of an amine and at least one

selected from the group consisting of formaldehyde, an oligomer of formaldehyde, a polymer of formaldehyde and a formaldehyde equivalent by reacting the two reactants for at least 15 minutes at above +15°C.

Claim 26 (Previously Presented): The process as claimed in Claim 20, further comprising:

fractionating the reaction mixture from c) by column chromatography over an acidic stationary phase by multistage elution with

- at least one hydrocarbon and then
- at least one basic alcohol/water mixture.

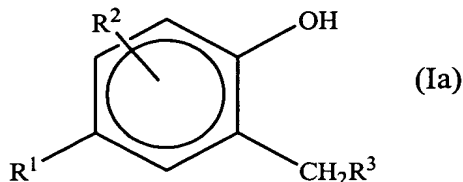
Claim 27 (Previously Presented): The process as claimed in claim 26, wherein the basic alcohol/water mixture is a mixture of

- a) from 75 to 99.5% by weight of at least one C<sub>2</sub>- to C<sub>4</sub>-alcohol,
- b) from 0.4 to 24.4% by weight of water, and
- c) from 0.1 to 15% by weight of at least one amine which is volatile at room temperature.

Claim 28 (Previously Presented): The process as claimed in Claim 20, wherein an adduct mixture obtained includes from 0 to 20 mol% of polyisobutenylphenols from reaction step a) which are not reacted further.

Claim 29 (Previously Presented): The process as claimed in Claim 20, wherein an adduct mixture obtained includes from 1-15 mol% of polyisobutenylphenols from a) which are not reacted further.

Claim 30 (Currently Amended): The process as claimed in Claim 1, wherein an adduct mixture is obtained which comprises at least 40 mol% of a compound of formula Ia

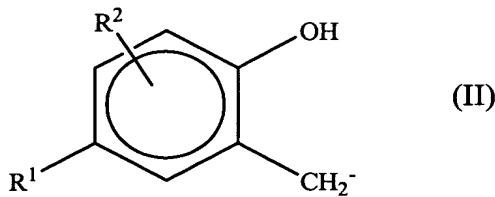


where  $R^1$  is a terminally bonded polyisobutenyl radical,

$R^2$  is H,  $C_1$ - to  $C_{20}$ -alkyl,  $C_1$ - to  $C_{20}$ -alkoxy, hydroxyl, a polyalkylenyl radical or  $CH_2NR^4R^5$ , ~~where  $R^4$  and  $R^5$  have the meanings stated below, and~~

$R^3$  is  $N(CH_3)_2$ ,

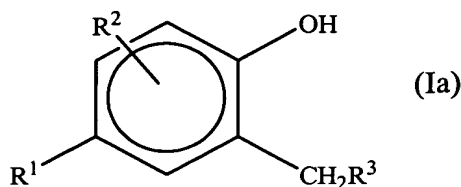
where  $R^4$  and  $R^5$ , independently of one another, are H,  $C_1$ - to  $C_{20}$ -alkyl,  $C_3$ - to  $C_8$ -cycloalkyl and  $C_1$ - to  $C_{20}$ -alkoxy radicals which may be at least one of interrupted and/or substituted by N and O heteroatoms, and phenol radicals of the formula II



where  $R^1$  and  $R^2$  are as defined above;

with the proviso that  $R^4$  and  $R^5$  are not simultaneously H or phenol radicals of the formula II; or  $R^4$  and  $R^5$ , together with the N atom to which they are bonded, form a 5-, 6- or 7-membered cyclic structure which has one or two N and O heteroatoms and may be substituted by one, two or three  $C_1$ - to  $C_6$ -alkyl radicals.

Claim 31 (Currently Amended): The process as claimed in Claim 1, wherein an adduct mixture is obtained which comprises at least 40 mol% of a compound of formula Ia

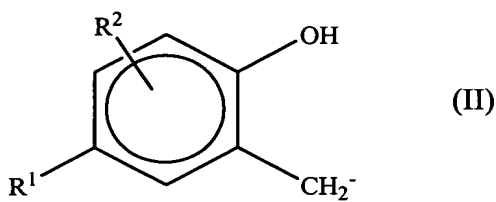


where  $R^1$  is a terminally bonded polyisobutenyl radical,

$R^2$  is H,  $C_1$ - to  $C_{20}$ -alkyl,  $C_1$ - to  $C_{20}$ -alkoxy, hydroxyl, a polyalkylenyl radical or  $CH_2NR^4R^5$ , ~~where  $R^4$  and  $R^5$  have the meanings stated below, and~~

$R^3$  is  $NR^{14}R^{15}$ ,

where  $R^4$  and  $R^5$ , independently of one another, are H,  $C_1$ - to  $C_{20}$ -alkyl,  $C_3$ - to  $C_8$ -cycloalkyl and  $C_1$ - to  $C_{20}$ -alkoxy radicals which may be at least one of interrupted and/or substituted by N and O heteroatoms, and phenol radicals of the formula II

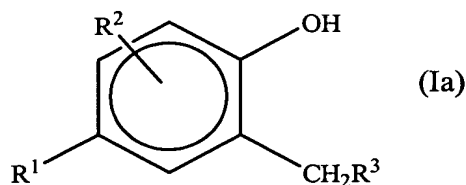


where  $R^1$  and  $R^2$  are as defined above;

with the proviso that  $R^4$  and  $R^5$  are not simultaneously H or phenol radicals of the formula II; or  $R^4$  and  $R^5$ , together with the N atom to which they are bonded, form a 5-, 6- or 7-membered cyclic structure which has one or two N and O heteroatoms and may be substituted by one, two or three  $C_1$ - to  $C_6$ -alkyl radicals, and

$R^{14}$  and  $R^{15}$   $N(R^4R^5)$  are independently, butyl groups selected from the group consisting of N-butyl n-butyl, isobutyl, sec-butyl, and tert-butyl.

Claim 32 (Currently Amended): The process as claimed in Claim 23, wherein an adduct mixture is obtained which comprises at least 40 mol% of a compound of formula Ia

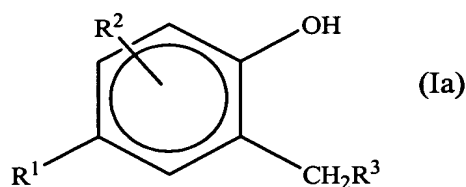


where R<sup>1</sup> is a terminally bonded polyisobutenyl radical,

R<sup>2</sup> is H, C<sub>1</sub>- to C<sub>20</sub>-alkyl, C<sub>1</sub>- to C<sub>20</sub>-alkoxy, hydroxyl, a polyalkylenyl radical or CH<sub>2</sub>NR<sup>4</sup>R<sup>5</sup>, ~~where R<sup>4</sup> and R<sup>5</sup> have the meanings stated below, and~~

R<sup>3</sup> is N(CH<sub>3</sub>)<sub>2</sub>.

Claim 33 (Currently Amended): The process as claimed in Claim 23, wherein an adduct mixture is obtained which comprises at least 40 mol% of a compound of formula Ia



where R<sup>1</sup> is a terminally bonded polyisobutenyl radical,

R<sup>2</sup> is H, C<sub>1</sub>- to C<sub>20</sub>-alkyl, C<sub>1</sub>- to C<sub>20</sub>-alkoxy, hydroxyl, a polyalkylenyl radical or CH<sub>2</sub>NR<sup>4</sup>R<sup>5</sup>, ~~where R<sup>4</sup> and R<sup>5</sup> have the meanings stated below, and~~

R<sup>3</sup> is ~~N(R<sup>4</sup>R<sup>5</sup>)~~ NR<sup>14</sup>R<sup>15</sup> where R<sup>14</sup> and R<sup>15</sup> are independently, butyl groups selected from the group consisting of N-butyl, isobutyl, sec-butyl, and tert-butyl.

Claims 34-46 (Canceled).

Claim 47 (Currently Amended): The Mannich adduct as claimed in Claim ~~[[10]]~~ 84, wherein the amine is at least one selected from the group consisting of dimethylamine, diethylamine, methylethylamine, di-n-propylamine, diisopropylamine, diisobutylamine, di-

sec-butylamine, di-tert-butylamine, dipentylamine, dihexylamine, dicyclopentylamine, dicyclohexylamine, and diphenylamine.

Claim 48 (Previously Presented): The process as claimed in Claim 20, wherein the polyisobutene has a number average molecular weight of from 500 to 1500.

Claim 49 (Previously Presented): The process as claimed in Claim 20, wherein the phenol is at least one of an unsubstituted phenol and an alkyl substituted phenol.

Claim 50 (Previously Presented): The process as claimed in Claim 20, wherein the phenol is 2-methyl phenol.

Claim 51 (Canceled).

Claim 52 (Currently Amended): The process as claimed in Claim ~~[[51]]~~ 20, wherein the amine is a secondary amine of formula  $\text{HNR}^4\text{R}^5$ , wherein  $\text{R}^4$  and  $\text{R}^5$  are independently a  $\text{C}_1\text{-C}_{20}$  alkyl radical which may be at least one of interrupted and substituted by at least one of N and O, wherein N and O may be substituted.

Claim 53 (Previously Presented): The process as claimed in Claim 20, wherein at least one of the  $\text{C}_1\text{-C}_{20}$  alkyl radicals is at least one of interrupted and substituted by at least one of N and O which is substituted with at least one selected from the group consisting of H,  $\text{C}_1\text{-C}_6\text{-alkyl}$ , aryl and hetaryl.



Claim 54 (Previously Presented): The process as claimed in Claim 20, wherein the amine is at least one selected from the group consisting of dimethylamine, diethylamine, methylethylamine, di-n-propylamine, diisopropylamine, diisobutylamine, di-sec-butylamine, di-tert-butylamine, dipentylamine, dihexylamine, dicyclopentylamine, dicyclohexylamine, and diphenylamine.

Claims 55-68 (Canceled).

Claim 69 (Currently Amended): The lubricant composition as claimed in Claim [[14]] 84, wherein the polyisobutene of the adduct has a number average molecular weight of from 500 to 1500.

Claim 70 (Currently Amended): The lubricant composition as claimed in Claim [[14]] 84, wherein the phenol of the adduct is at least one of an unsubstituted phenol and an alkyl substituted phenol.

Claim 71 (Currently Amended): The lubricant composition as claimed in Claim [[14]] 84, wherein the phenol of the adduct is 2-methyl phenol.

Claim 72 (Canceled).

Claim 73 (Currently Amended): The lubricant composition as claimed in Claim [[14]] 84, wherein the amine of the adduct is a secondary amine of formula  $\text{HNR}^4\text{R}^5$ , wherein  $\text{R}^4$  and  $\text{R}^5$  are independently a  $\text{C}_1$ - $\text{C}_{20}$  alkyl radical which may be at least one of interrupted and substituted by at least one of N and O, wherein N and O may be substituted.

Claim 74 (Previously Presented): The lubricant composition as claimed in Claim 73, wherein at least one of the C<sub>1</sub>-C<sub>20</sub> alkyl radicals is at least one of interrupted and substituted by at least one of N and O which is substituted with at least one selected from the group consisting of H, C<sub>1</sub>-C<sub>6</sub>-alkyl, an aryl group and a hetaryl group.

Claim 75 (Currently Amended): The lubricant composition as claimed in Claim [[14]] 84, wherein the amine of the adduct is at least one selected from the group consisting of dimethylamine, diethylamine, methylethylamine, di-n-propylamine, diisopropylamine, diisobutylamine, di-sec-butylamine, di-tert-butylamine, dipentylamine, dihexylamine, dicyclopentylamine, dicyclohexylamine, and diphenylamine.

Claim 76 (New): A process for the preparation of polyisobutenylphenol-containing Mannich adducts, comprising:

a) alkylating a phenol with at least one polyisobutene having more than 70 mol % of vinylidene double bonds and a number average molecular weight of from 300 to 3000 at below about 50°C in the presence of an alkylation catalyst;

b) reacting the reaction product from a) with formaldehyde, an oligomer or a polymer of formaldehyde and

at least one amine which has at least one secondary amino function and no primary amino function, and

fractionating the reaction mixture from b) by column chromatography over an acidic stationary phase by multistage elution with

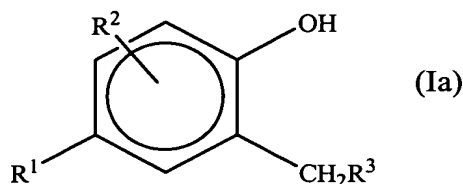
- at least one hydrocarbon and then
- at least one basic alcohol/water mixture.

Claim 77 (New): The process as claimed in Claim 76, wherein the phenol is 2-methylphenol and the amine is n-butylamine.

Claim 78 (New): A process for the preparation of polyisobutenylphenol-containing Mannich adducts, comprising:

a) alkylating a phenol with at least one polyisobutene having more than 70 mol % of vinylidene double bonds and a number average molecular weight of from 300 to 3000 at below about 50°C in the presence of an alkylation catalyst;

b) reacting the reaction product from a) with formaldehyde, an oligomer or a polymer of formaldehyde, and at least one amine which has at least one secondary amino function and no primary amino function, to form an adduct mixture comprising at least 40 mol% of a compound of formula Ia



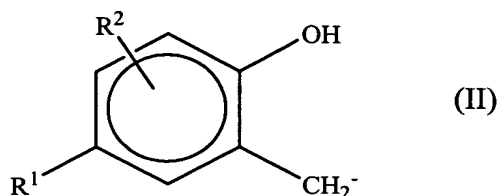
where

R<sup>1</sup> is a terminally bonded polyisobutenyl radical,

R<sup>2</sup> is H, C<sub>1</sub>- to C<sub>20</sub>-alkyl, C<sub>1</sub>- to C<sub>20</sub>-alkoxy, hydroxyl, a polyalkylenyl radical or CH<sub>2</sub>NR<sup>4</sup>R<sup>5</sup>, where R<sup>4</sup> and R<sup>5</sup> have the meanings stated below, and

R<sup>3</sup> is N(CH<sub>3</sub>)<sub>2</sub>,

where R<sup>4</sup> and R<sup>5</sup>, independently of one another, are H, C<sub>1</sub>- to C<sub>20</sub>-alkyl, C<sub>3</sub>- to C<sub>8</sub>-cycloalkyl and C<sub>1</sub>- to C<sub>20</sub>-alkoxy radicals which may be at least one of interrupted and/or substituted by N and O heteroatoms, and phenol radicals of the formula II



where  $R^1$  and  $R^2$  are as defined above;

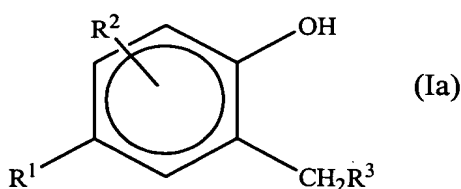
with the proviso that  $R^4$  and  $R^5$  are not simultaneously H or phenol radicals of the formula II; or  $R^4$  and  $R^5$ , together with the N atom to which they are bonded, form a 5-, 6- or 7-membered cyclic structure which has one or two N and O heteroatoms and may be substituted by one, two or three  $C_1$ - to  $C_6$ -alkyl radicals.

Claim 79 (New): The process as claimed in Claim 78, wherein the phenol is 2-methylphenol and the amine is n-butylamine.

Claim 80 (New): A process for the preparation of polyisobutenylphenol-containing Mannich adducts, comprising:

a) alkylating a phenol with at least one polyisobutene having more than 70 mol % of vinylidene double bonds and a number average molecular weight of from 300 to 3000 at below about  $50^\circ C$  in the presence of an alkylation catalyst;

b) reacting the reaction product from a) with formaldehyde, an oligomer or a polymer of formaldehyde, and at least one amine which has at least one secondary amino function and no primary amino function, to form an adduct mixture comprising at least 40 mol% of a compound of formula Ia



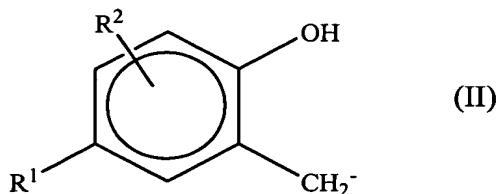
where

$R^1$  is a terminally bonded polyisobutenyl radical,

$R^2$  is H,  $C_1$ - to  $C_{20}$ -alkyl,  $C_1$ - to  $C_{20}$ -alkoxy, hydroxyl, a polyalkylenyl radical or  $CH_2NR^4R^5$ , where  $R^4$  and  $R^5$  have the meanings stated below, and

$R^3$  is  $N(R^{14}R^{15})$ , where  $R^{14}$  and  $R^{15}$  are, independently butyl groups selected from the group consisting of n-butyl, isobutyl, sec-butyl, and tert-butyl,

where  $R^4$  and  $R^5$ , independently of one another, are H,  $C_1$ - to  $C_{20}$ -alkyl,  $C_3$ - to  $C_8$ -cycloalkyl and  $C_1$ - to  $C_{20}$ -alkoxy radicals which may be interrupted and/or substituted by N and O heteroatoms, and phenol radicals of the formula II



where  $R^1$  and  $R^2$  are as defined above;

with the proviso that  $R^4$  and  $R^5$  are not simultaneously H or phenol radicals of the formula II; or  $R^4$  and  $R^5$ , together with the N atom to which they are bonded, form a 5-, 6- or 7-membered cyclic structure which has one or two N and O heteroatoms and may be substituted by one, two or three  $C_1$ - to  $C_6$ -alkyl radicals.

Claim 81 (New): The process as claimed in Claim 80, wherein the phenol is 2-methylphenol and the amine is n-butylamine.

Claim 82 (New): A process for the preparation of polyisobutenylphenol-containing Mannich adducts, comprising:

a) alkylating a phenol with at least one polyisobutene having more than 70 mol % of vinylidene double bonds and a number average molecular weight of from 300 to 3000 at below about 50°C in the presence of an alkylation catalyst;

b) reacting the reaction product from a) with formaldehyde, an oligomer or a polymer of formaldehyde, and at least one amine which has at least one secondary amino function and no primary amino function,

wherein the amine is at least one selected from the group consisting of dimethylamine, diethylamine, methylethylamine, di-n-propylamine, diisopropylamine, diisobutylamine, di-sec-butylamine, di-tert-butylamine, dipentylamine, dihexylamine, dicyclopentylamine, dicyclohexylamine, and diphenylamine.

Claim 83 (New): The process as claimed in Claim 82, wherein the phenol is 2-methylphenol.

Claim 84 (New): A lubricant composition containing a main amount of at least one of a liquid lubricant, a semisolid lubricant, and a solid lubricant, and at least one Mannich adduct obtained by

a) alkylation of a phenol with polyisobutene having more than 70 mol % of vinylidene double bonds and a number average molecular weight of from 300 to 3000 at below about 50°C in the presence of an alkylation catalyst;

b) reaction of the reaction product from a) with formaldehyde, an oligomer or a polymer of formaldehyde and at least one amine which has at least one secondary amino function and no primary amino function.

Claim 85 (New): The lubricant as claimed in Claim 84, wherein the phenol is 2-methylphenol and the amine is n-butylamine.

Claim 86 (New): A process for the preparation of polyisobutenylphenol-containing Mannich adducts, comprising:

a) alkylating a phenol with at least one polyisobutene having more than 70 mol % of vinylidene double bonds and a number average molecular weight of from 300 to 3000 at below about 50°C in the presence of an alkylation catalyst;

b) reacting the reaction product from a) with formaldehyde, an oligomer or a polymer of formaldehyde, and at least one amine which has at least one secondary amino function and no primary amino function,

wherein the amine is at least one selected from the group consisting of dimethylamine, diethylamine, methylethylamine, di-n-propylamine, diisopropylamine, diisobutylamine, di-sec-butylamine, di-tert-butylamine, dipentylamine, dihexylamine, dicyclopentylamine, dicyclohexylamine, and diphenylamine.

Claim 87 (New): The process as claimed in Claim 86, wherein the phenol is 2-methylphenol.

Claim 88 (New): A fuel composition containing a main amount of a liquid hydrocarbon fuel and an amount of at least one Mannich adduct obtained by

a) alkylation of a phenol with polyisobutene having more than 70 mol% of vinylidene double bonds and a number average molecular weight of from 300 to 3000 and below about 50°C in the presence of an alkylation catalyst;

b) reaction of the reaction product from a) with formaldehyde, an oligomer or a polymer of formaldehyde, and at least one amine which has at least one secondary amino function and no primary amino function,

wherein the amine of the adduct is at least one selected from the group consisting of dimethylamine, diethylamine, methylethylamine, di-n-propylamine, diisopropylamine, diisobutylamine, di-sec-butylamine, di-tert-butylamine, dipentylamine, dihexylamine, dicyclopentylamine, dicyclohexylamine, and diphenylamine.

Claim 89 (New): The fuel composition as claimed in Claim 88, wherein the phenol is 2-methylphenol.



BASIS FOR THE AMENDMENT

Claims 1, 8-9, 20-33, 47-50, 52-54, 69-71, 73-89 are active in the present application. Claims 2-7, 10-19, 34-46, 51, 55-68 and 72 are canceled claims. Claims 76-89 are new claims. Support for new independent Claim 76 is found in previously presented Claims 1 and 7. Support for the new dependent claims which recite 2-methylphenol and/or butylamine is found in the specification as originally filed, e.g., page 9, lines 19-26 and page 5, line 15. Support for new independent Claim 78 is found in previously presented Claims 1 and 4. Support for new independent Claim 80 is found in previously presented Claims 1 and 31. Support for new independent Claim 82 is found in previously presented Claims 1 and 40. Support for new independent Claim 86 is found in previously presented Claims 1 and 40. Support for new independent Claim 88 is found in previously presented Claims 1, 13, and 61.

No new matter is added.